



Acute health care utilization and outcomes for outpatient-treated urinary tract infections in children

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Summary

Introduction

The majority of urinary tract infections (UTIs) in children are treated in the ambulatory setting. The goal of this study is to describe the course of outpatient UTI management, including health services utilization, antibiotic switching (change from empirically prescribed antibiotic to another antibiotic), and antibiotic side effects.

Methods

Using a large claims database, Truven Health MarketScan Research Database, we analyzed all children younger than 18 years old who had an antibiotic prescribed for an outpatient UTI from 2002 to 2010. We evaluated health services utilization and antibiotic switching in the 21-day period after UTI diagnosis. We compared side effects with rates in patients receiving narrow versus broad-spectrum antibiotic treatment. Chi-square analysis was used for descriptive statistics.

Results

We identified 242,819 outpatient, antibiotic-treated, UTI episodes. During the 21-day period

after presentation, 26% required more than one visit for UTI management and <1% required hospital admission (Figure). Most children did not have imaging within 21 days of UTI: renal bladder ultrasound in 6%, VCUG in 2.6%, and DMSA in 0.05%. Broad-spectrum antibiotics were empirically prescribed to 34% of patients. Antibiotic switching occurred in only 8% of UTI episodes, indicating that empiric prescription covered the offending uropathogen the majority of the time. Antibiotic side effects occurred in 8% of UTI episodes. The most common side effects were gastrointestinal (~3% of UTI episodes). All other side effects occurred in <1% of UTI episodes. Although there were statistically significant differences in side effects between broad- and narrow-spectrum antibiotics, these differences were not clinically relevant.

Conclusions

Most outpatient UTIs in children do not require more than one healthcare visit, hospital admission, or change in empiric antibiotic therapy. This study supports the fact that pediatric UTIs can be effectively treated in the ambulatory setting.

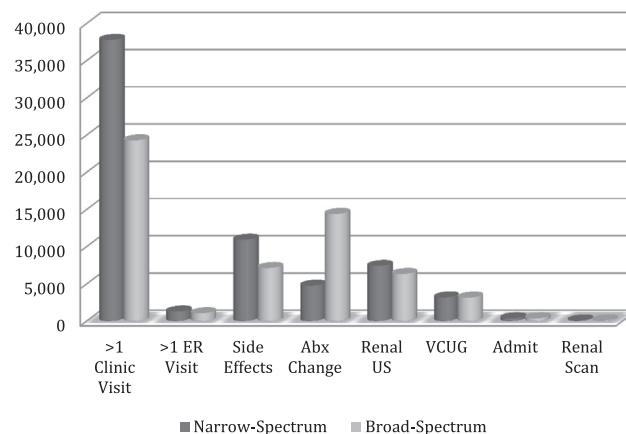


Figure UTI outcomes in the 21 days after diagnosis by antibiotic type.

Introduction

Empiric antibiotic prescription for outpatient UTI management is often necessary. Prior studies have shown that the most children are empirically prescribed narrow-spectrum antibiotics. Little information is available regarding health services utilization, change in empiric antibiotic prescription (antibiotic switching), and antibiotic side effects experienced during the acute period of outpatient UTI management. The goal of this study is to characterize acute health care utilization and outcomes in children with UTI managed in the ambulatory setting.

Methods

Study design and data source

We performed a retrospective observational study analyzing all UTI episodes in children younger than 18 years old who had an antibiotic prescribed for an outpatient UTI from 2002 to 2010. We used data from the Truven Health MarketScan Database, which contains patient-level, de-identified data from all socio-economic distributions throughout the country. It includes healthcare claims from employer health plans, individual health plans, hospitals, Medicare, and Medicaid. It includes fee-for-service providers, preferred provider organization, and capitated health plans. It is the largest healthcare database in the USA, and includes both inpatient and outpatient data. These databases reflect the real world of treatment patterns and costs by tracking millions of patients as they travel through the healthcare system, offering detailed information about all aspects of care. Data from individual patients are de-identified and integrated from all providers of care, maintaining all healthcare utilization and cost record connections at the patient level. Available data include patient demographics such as age and gender, procedure and diagnosis codes, dates of service, and reimbursement claims for laboratory testing and filled prescriptions. The prescription claims include the medication name, therapeutic class, and fill date.

Urinary tract infection episode

A UTI episode was defined as the 21-day period after UTI diagnosis. We included all children <18 years old who had an outpatient visit (defined as a visit to the clinic, emergency room, or urgent care center) with a primary diagnosis of UTI (International Classification of Diseases, Ninth Revision (595.0, 595.9, 590.1x, 590.2, 590.8, 590.9, and 590.2) and had an antibiotic prescribed within 3 days before, and 5 days after the UTI visit [1]. Patients with UTI as a secondary diagnosis were included only if fever (780.6) or dysuria (788.1) was the primary diagnosis. These additional codes were used as they are often presenting symptoms of UTI [1,2]. We included these codes to capture differences in the way physicians may assign ICD-9 codes at patient visits. Some physicians may not assign UTI as the primary diagnosis to a visit without confirmation by a positive culture. In addition, to more accurately capture comorbidities and

recurrent UTI events, we required enrollment in the database 1 year prior to inclusion, or since birth, and 1 year after the diagnosis of UTI.

We required the duration of the antibiotic prescription to be <30 days to exclude prescriptions written for antibiotic prophylaxis. To ensure that UTI was the principal reason for the visit and the antibiotic prescription, we excluded visits in which patients were diagnosed with a UTI and another infection as described previously [2]. UTI visits associated with hospital admission within 2 days of the initial UTI visit were not included to limit the analysis to management in the outpatient setting. Hospital admission after the initial 2-day period was included as a failure of outpatient management.

Definitions and measurements

We categorized narrow- and broad-spectrum antibiotics using the national drug code directory and the American hospital formulary service. We excluded topical antibiotics. To define patients treated with parenteral antibiotics we used J codes; J codes define the use of IV antibiotics given in a clinic setting, this defines a procedure that requires a nurse to deliver the medication. We created the following categories: narrow-spectrum and broad-spectrum as previously described [1,2]. We defined antibiotics as broad-spectrum if they were able to cover both gram-positive and gram-negative organisms. Narrow-spectrum antibiotics were defined as antibiotics with coverage of specific families of bacteria, or only gram-positive or gram-negative organisms. For example, aminoglycoside antibiotics are bactericidal for gram-negative aerobes and some anaerobic bacilli, but generally they are not effective for gram-positive and anaerobic gram-negative bacteria; hence, aminoglycosides were classified as narrow-spectrum. As in prior studies, we defined narrow-spectrum antibiotics as first-generation cephalosporins, sulfonamides, nitrofurantoin, methenamine mandelates, tetracyclines, aminoglycosides, and penicillins except the sulbactams. Broad-spectrum antibiotics were defined as penicillins that were antipseudomonal or had B-lactamase/B-lactam inhibitor combinations, second-, third-, fourth-generation cephalosporins, macrolides, quinolones, lincosamides, and carbapenams.

We defined the empiric antibiotic as the first antibiotic prescribed if multiple antibiotics were prescribed during the UTI episode. Antibiotic switching was defined by a change to a second antibiotic in the 21-day period.

Antibiotic side effects were identified by ICD-9 code signs and symptoms and grouped into nine different categories: allergic, cardiac, dermatologic, gastrointestinal, musculoskeletal, neurologic, respiratory, fluid or electrolyte abnormalities, and secondary infections. For example, the renal side effects were defined by signs or symptoms such as electrolyte changes or volume depletion.

Urine culture was assessed by current procedural terminology codes (87,086, 87,088, 87,181, 87,184, 87,185, 87,186, and 87,188). Urine culture use within 3 days before or after the first antibiotic prescription in a UTI episode was captured. This extended window to capture claims for urine culture was performed to ensure that culture use was not

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